



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

<b>(51) International Patent Classification<sup>3</sup> :</b>  <b>A63B 59/12</b>	<b>A1</b>	<b>(11) International Publication Number:</b> <b>WO 82/03789</b>  <b>(43) International Publication Date:</b> 11 November 1982 (11.11.82)
<b>(21) International Application Number:</b> PCT/SE82/00148 <b>(22) International Filing Date:</b> 4 May 1982 (04.05.82)  <b>(31) Priority Application Number:</b> 8102836-7 <b>(32) Priority Date:</b> 6 May 1981 (06.05.81) <b>(33) Priority Country:</b> SE  <b>(71)(72) Applicants and Inventors:</b> HELLE, Antti [SE/SE]; Tunastigen 60, S-951 58 Luleå (SE). BLOMQVIST, Villhard [SE/SE]; Nätgatan 10, S-951 40 Luleå (SE).  <b>(74) Agents:</b> AB STOCKHOLMS PATENTBYRÅ, ZACCO & BRUHN et al.; Box 3129, S-103 62 Stockholm (SE).  <b>(81) Designated States:</b> DE, FI, NO, SU, US.		<b>Published</b> <i>With international search report.</i>
<b>(54) Title:</b> METHOD OF MANUFACTURING A STICK AND A STICK MANUFACTURED ACCORDING TO SAID METHOD		
<b>(57) Abstract</b>  Method of manufacturing a stick (1, 1') and a stick manufactured according to said method. The object of the present invention is to propose a method for the manufacture of a stick, which substantially shall have the same properties as a conventional wood stick. The method according to the invention is characterized in that a core (4, 4') of polyurethane foam is formed, that the foam is caused to cure, that a plurality of holes (7, 7') are made in the blade portion (3, 3'), that at least one longitudinal groove (5, 5') is made in the handle portion (2, 2'), that a reinforcement strip (8, 8') of glass-fibre reinforced polyester is placed in the groove (5, 5'), that a tape (9, 9') of woven glass fabric is wound about the core (4, 4'), that a hose (10, 10') of woven glass fabric is threaded on the outside of the tape (9, 9'), and that a surface layer of polyester plastic is applied on the core (4, 4') with reinforcement.		

**FOR THE PURPOSES OF INFORMATION ONLY**

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AT	Austria	KP	Democratic People's Republic of Korea
AU	Australia	LI	Liechtenstein
BE	Belgium	LK	Sri Lanka
BR	Brazil	LU	Luxembourg
CF	Central African Republic	MC	Monaco
CG	Congo	MG	Madagascar
CH	Switzerland	MW	Malawi
CM	Cameroon	NL	Netherlands
DE	Germany, Federal Republic of	NO	Norway
DK	Denmark	RO	Romania
FI	Finland	SE	Sweden
FR	France	SN	Senegal
GA	Gabon	SU	Soviet Union
GB	United Kingdom	TD	Chad
HU	Hungary	TG	Togo
JP	Japan	US	United States of America

Method of manufacturing a stick and a stick manufactured according to said method

This invention relates to a method of manufacturing a stick, preferably for bandy or ice-hockey, and to a stick manufactured according to said method.

At present only bandy and ice-hockey sticks made of wood are used in practice. It is not only extremely difficult to procure the raw material (a special sort of wood), but these sticks, in addition, also are manufactured in a great variety of working moments, which are carried out manually. Such bandy and ice-hockey sticks, consequently, are extremely expensive to manufacture.

It was also tried to manufacture sticks, especially ice-hockey sticks, of synthetic materials, but they apparently did not compare favourably with the sticks made of wood, because they never got established on the market.

The present invention has the object to propose a method for the manufacture of a bandy or ice-hockey stick, which is extremely cheap to manufacture and, besides, has properties very similar to those of conventional wood sticks.

This object is realized by a method and a stick, which have been given the characterizing features defined in the attached claims.

An embodiment of the invention is described in the following, with reference to the accompanying drawings, in which Fig. 1 is a schematic view of a bandy stick according to the invention,

Fig. 2 is a section along II-II in Fig. 1,

Fig. 3 is a section along III-III in Fig. 1,

Fig. 4 is a schematic view of an ice-hockey stick according to the invention,

Fig. 5 is a section along V-V in Fig. 4, and

Fig. 6 is a section along VI-VI in Fig. 4.

The bandy stick shown in Figs. 1-3 comprises a handle portion 2, which at one end transforms to a curved blade portion 3.

The bandy stick 1 is built up of a core 4 of polyurethane foam with a density of preferably 100-400 g/litre. In said core 4 a reinforcing strip 8, preferably of glass-fibre reinforced polyester, is attached. At the contact surface of the stick with the ice, furthermore, an additional reinforcing portion 5 of plastic sheet laminate or Teflon is located.

The first manufacturing step, i.e. the manufacture of the core 4, proceeds so that polyurethane foam is injected into a foam mould. The density of the core 4 can be varied by varying the amount of polyurethane foam injected into the mold.

Subsequent to the setting of the foam, the mould is removed, and the core 4 is ready.

A longitudinal groove 5 is now sawn into the core 4 so as to extend from the free end of the handle portion 2 to the region of the blade portion 3, into which a plurality of holes 7 are drilled.

Into said groove 5 a reinforcing strip 8 of glass-fibre reinforced polyester is laid, so-called one-way roving. The reinforcing strip 8 has a thickness smaller than the width of the groove 8, as shown in Fig. 2. The height of the strip 8 is equal to the height of the groove 5.

The manufacturing process continues in that a tape 9 of directed glass fibre, so-called one-way roving, is wound about the core 4 from the free end of the blade portion 3 to the free end of the handle portion 2. The winding is made with some overlapping, which is greater in the blade portion 3 and adjoining part of the handle portion 2. The tape 9 retains the reinforcing strip 8 in place in the groove 5.

BEST AVAILABLE COPY



Over the outside of the tape 9 wound-on a hose 10 of diagonally woven glass fibre (roving 50-50) is drawn and extends all the way from the free end of the blade portion 3 to the free end of the handle portion 2. In this manufacturing phase the hose 10 has the object of keeping the tape 9 in place.

The core 4 with the reinforcing portion 5, reinforcing strip 8, tape winding 9 and hose 10 is placed into an injection mould, into which polyester plastic is injected which thereby forms a surface layer 11 about the entire core 4. See Figs. 2 and 3.

The polyester plastic also fills the holes 7 in the blade portion 3, whereby small staves of polyester plastic are formed which extend transversely through the blade portion 3 and reinforce the same.

Due to the thickness of the reinforcing strip 8 being smaller than the width of the groove 5, the polyester plastic penetrates into the groove 5 and encloses the strip 8 on its two sides.

The polyester plastic also penetrates into the hose 10 and tape winding 9 all the way inward to the core 4.

Subsequent to the setting and mould removal, the stick is ground smooth and varnished.

When a bandy stick is to be manufactured which meets very high strength requirements, glass fibre tapes 12 of directed type (roving 50-50) are applied on the sides of greater planeness of the handle portion 2 on the outside of the hose 10 before the core 4 with reinforcements is positioned in the injection mould.

The ice-hockey stick 1' shown in Figs. 4-6 is built up according to the same principle as the bandy stick 1 shown in Figs. 1-3. The ice-hockey stick 1' comprises a handle portion 2' and a blade portion 3'.

In a manner corresponding to that for the bandy stick, a core 4' is injection moulded. The stick, thus, can have different density and thereby vary in weight.

In the foam mould a reinforcing portion 6' is attached which, thus, is integrated with the core 4'.

As appears from Figs. 4 and 5, the handle portion 2' of the ice-hockey stick 1' is provided with three reinforcing strips 8' of glass-fibre reinforced polyester. This implies that three grooves 5' must be arranged. The strips 8' have a thickness smaller than the width of the grooves 5'.

The blade portion 3' is provided with a plurality of holes 7', preferably with a diameter of 3 mm.

In a manner corresponding to that for the bandy stick, a tape 9' of directed glass fibre is wound about the core 4' along the entire length thereof. Overlapping is applied which is greatest in the region of the blade portion 3' and adjacent part of the handle portion 2'.

Over the outside of the tape winding 9' a hose 10' of roving (90-10) is drawn and extends from the tip of the blade portion 3' to the free end of the handle portion 2'.

The core 4' with reinforcements is positioned in an injection mould whereafter polyester plastic is injected into the mould in a manner corresponding to that at the manufacture of the bandy stick.

After setting a surface layer 11' of polyester plastic is formed which preferably has a thickness of about 1.5 mm.

When a stick with extra rigid handle portion 2' is desired, two additional reinforcing tapes 12' of roving (50-50) according to Fig. 5 are attached.

The manufacturing method described above renders it possible to manufacture, for example, bandy and ice-hockey sticks with desired weight distribution and strength properties. The density of the core 4,4', for example, can be varied, certain reinforcements, for example the tapes 12,12', can be abandoned, reinforcements with certain special properties can be used, and the number of reinforcements, for example of the strips 8,8', can be varied.

It is, of course, also possible to imagine the above method be applied to the manufacture of sticks for sports other than bandy and ice-hockey.

BEST AVAILABLE COPY



Claims

1. A method of manufacturing sticks, preferably for bandy or ice-hockey, c h a r a c t e r i z e d i n that a core (4,4') of polyurethane foam is formed which consists of a handle portion (2,2') and a blade portion (3,3'), that the foam is caused to set, that a plurality of holes (7,7') are made in the blade portion (3,3'), that at least one longitudinal groove (5,5') is made in the handle portion (2,2'), that a reinforcing strip (8,8') preferably of glass-fibre reinforced polyester, is laid into the groove (5,5'), that a tape (9,9') of woven glass fabric is wound about the core (4,4'), that a hose (10,10') of woven glass fabric is drawn upon the core (4,4') on the outside of the tape (9,9'), that a layer of polyester plastic is applied about the entire core (4,4') with its reinforcements, and that the polyester plastic is caused to set.
2. A method as defined in claim 1, c h a r a c t e r i z e d i n that the polyester plastic fills the holes (7,7') in the blade portion (3,3').
3. A method as defined in claim 1 or 2, c h a r a c t e r i z e d i n that on the glass fibre hose (10,10') tape (12,12') of woven glass fabric is applied in the region for the handle portion (2,2') before the layer of polyester plastic is applied.
4. A method as defined in any one or more of the preceding claims, c h a r a c t e r i z e d i n that the tape (9,9') is wound on with overlapping, which is greatest on the blade portion (3,3') and adjoining part of the handle portion (2,2').
5. A stick, preferably for bandy or ice-hockey, c h a r a c t e r i z e d i n that it comprises a core (4,4') of cured polyurethane foam, which core comprises a handle portion (2,2') and a blade portion (3,3'), that in the core (4,4') at least one reinforcing strip (8,8'), preferably of

BEST AVAILABLE COPY



glass-fibre reinforced polyester plastic, is attached, that a tape (9,9') of woven glass fabric is wound on the core (4,4'), that a hose (10,10') of woven glass fabric is threaded on the outside of the tape (9,9'), and that on the outside of the core (4,4') and glass fibre reinforcements a surface layer (11,11') of polyester plastic is applied.

6. A stick as defined in claim 5, characterized in that the blade portion (3,3') is provided with holes (7,7'), which are filled with the polyester plastic forming the surface layer.

7. A stick as defined in claim 5 or 6, characterized in that a reinforcing portion (6,6') is connected to the core (4,4') in the region for the blade portion (3,3').

8. A stick as defined in any one or more of the claims 5-7, characterized in that the reinforcing strips (8,8') have a thickness smaller than the width of the grooves (5,5').

9. A stick as defined in any one or more of the claims 5-8, characterized in that on the handle portion (2,2') between the hose (10,10') and the surface layer (11,11') longitudinal tapes (12,12') of woven glass fabric are applied.

BEST AVAILABLE COPY





FIG.1

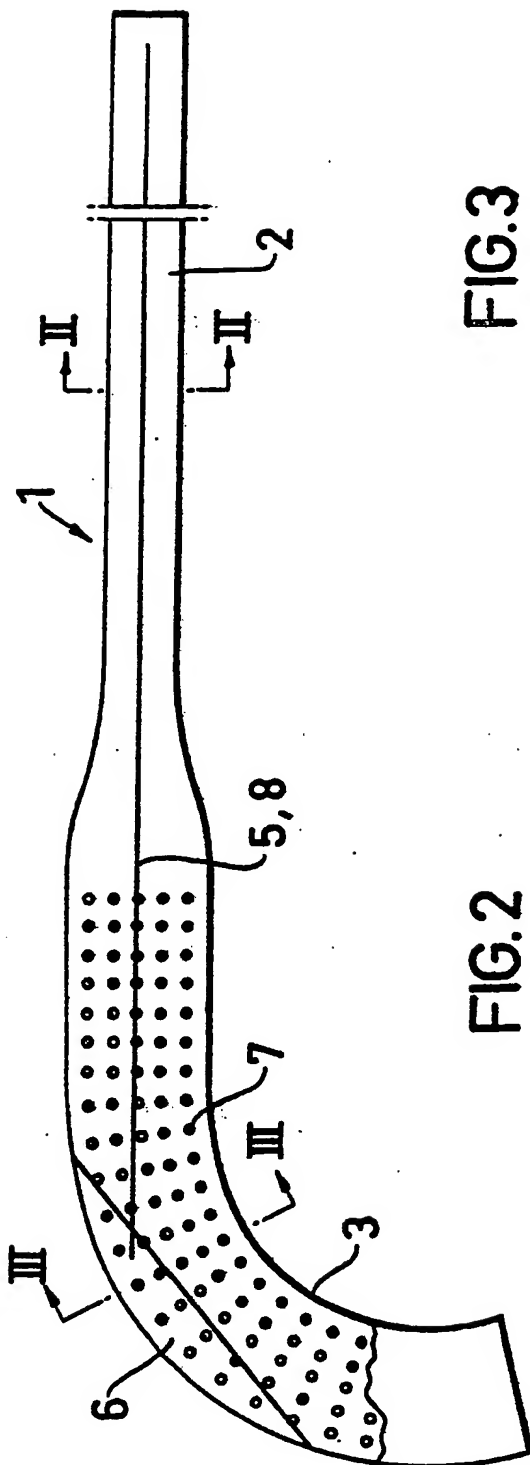


FIG.2

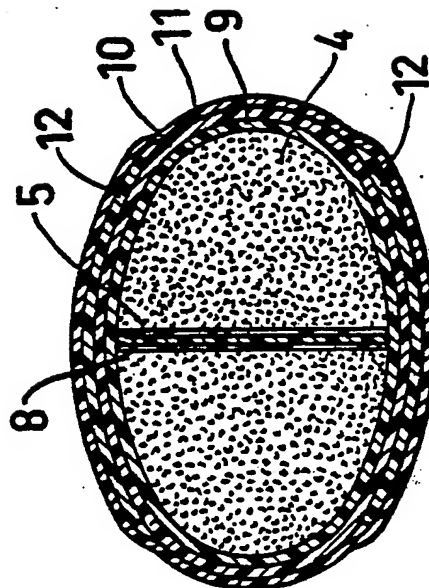
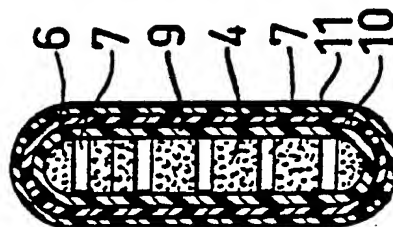
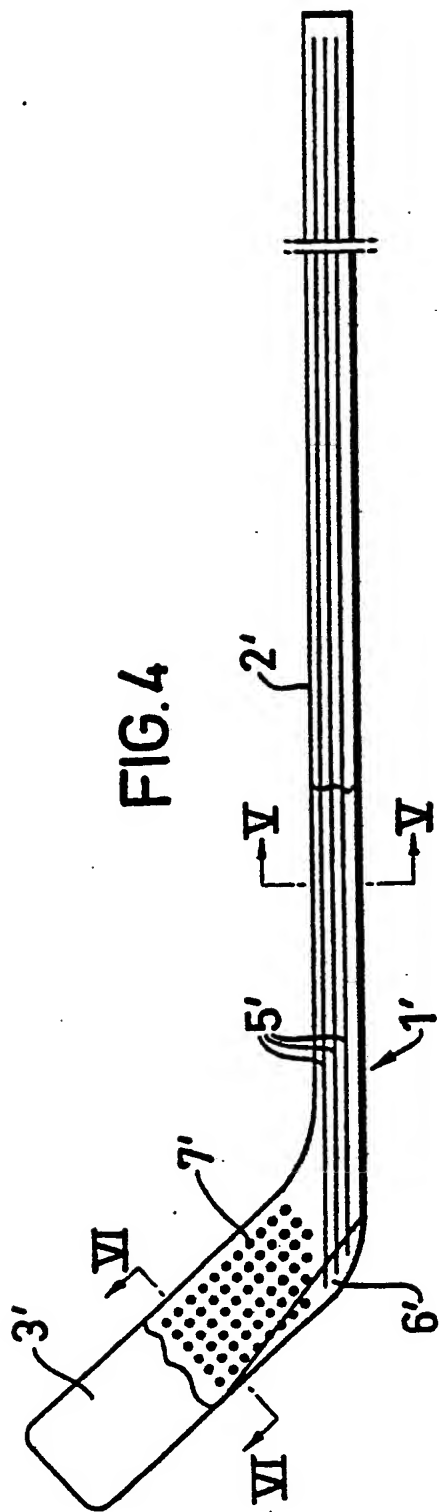


FIG.3

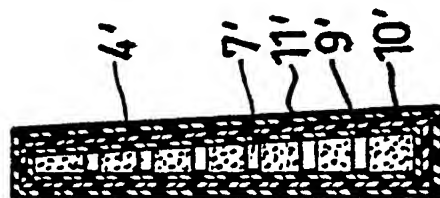


BEST AVAILABLE COPY

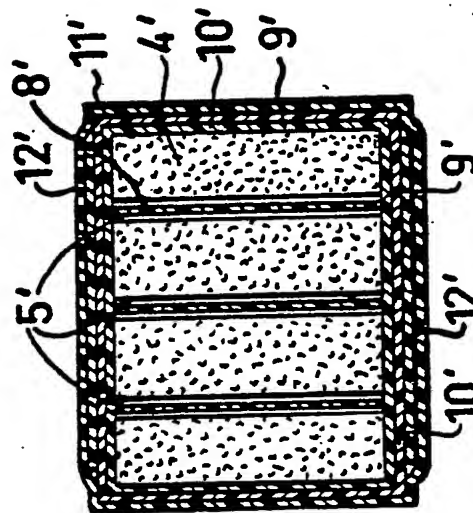




**FIG. 6**



**FIG. 5**



BEST AVAILABLE COPY



# INTERNATIONAL SEARCH REPORT

International Application No

PCT/SE82/00148

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) <sup>3</sup> According to International Patent Classification (IPC) or to both National Classification and IPC <b>3</b> <div style="margin-left: 40px;">A 63 B 59/12</div>																				
<b>II. FIELDS SEARCHED</b> <div style="text-align: center; margin-top: 10px;">Minimum Documentation Searched <sup>4</sup></div> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%;">Classification System</th> <th style="width: 75%;">Classification Symbols</th> </tr> <tr> <td style="padding: 5px;">IPC 3</td> <td style="padding: 5px;">A 63 B 53/00, 04, 08, 10, 59/00, 12, 14</td> </tr> <tr> <td style="padding: 5px;">US C1</td> <td style="padding: 5px;">273:67, 72, 73, 77-80</td> </tr> </table> <div style="text-align: center; margin-top: 10px;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched <sup>6</sup></div> <div style="margin-top: 10px;">SE, NO, DK, FI classes as above</div>			Classification System	Classification Symbols	IPC 3	A 63 B 53/00, 04, 08, 10, 59/00, 12, 14	US C1	273:67, 72, 73, 77-80												
Classification System	Classification Symbols																			
IPC 3	A 63 B 53/00, 04, 08, 10, 59/00, 12, 14																			
US C1	273:67, 72, 73, 77-80																			
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT</b> <sup>14</sup> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%;">Category <sup>5</sup></th> <th style="width: 60%;">Citation of Document, <sup>15</sup> with indication, where appropriate, of the relevant passages <sup>17</sup></th> <th style="width: 30%;">Relevant to Claim No. <sup>18</sup></th> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">SE, B, 358 558 (P PEILLEX) 6 August 1973</td> <td></td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">DE, A, 2 061 778 (M GARTLAND) 2 September 1971</td> <td></td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">US, A, 3 353 826 (A J TRAVERSE) 21 November 1967</td> <td></td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">US, A, 4 124 208 (C E BURNS) 7 November 1978</td> <td></td> </tr> <tr> <td style="text-align: center; vertical-align: top; padding: 5px;">A</td> <td style="padding: 5px;">US, A, 4 212 461 (A M CECKA, P G PAWLING) 15 July 1980</td> <td></td> </tr> </table>			Category <sup>5</sup>	Citation of Document, <sup>15</sup> with indication, where appropriate, of the relevant passages <sup>17</sup>	Relevant to Claim No. <sup>18</sup>	A	SE, B, 358 558 (P PEILLEX) 6 August 1973		A	DE, A, 2 061 778 (M GARTLAND) 2 September 1971		A	US, A, 3 353 826 (A J TRAVERSE) 21 November 1967		A	US, A, 4 124 208 (C E BURNS) 7 November 1978		A	US, A, 4 212 461 (A M CECKA, P G PAWLING) 15 July 1980	
Category <sup>5</sup>	Citation of Document, <sup>15</sup> with indication, where appropriate, of the relevant passages <sup>17</sup>	Relevant to Claim No. <sup>18</sup>																		
A	SE, B, 358 558 (P PEILLEX) 6 August 1973																			
A	DE, A, 2 061 778 (M GARTLAND) 2 September 1971																			
A	US, A, 3 353 826 (A J TRAVERSE) 21 November 1967																			
A	US, A, 4 124 208 (C E BURNS) 7 November 1978																			
A	US, A, 4 212 461 (A M CECKA, P G PAWLING) 15 July 1980																			
<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><sup>19</sup> Special categories of cited documents:</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&amp;" document member of the same patent family</p> </div> </div>																				
<b>IV. CERTIFICATION</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;">           Date of the Actual Completion of the International Search <sup>1</sup>  <div style="text-align: center;">1982-07-23</div> </td> <td style="width: 50%; padding: 5px;">           Date of Mailing of this International Search Report <sup>2</sup>  <div style="text-align: center;">1982-07-29</div> </td> </tr> <tr> <td style="padding: 5px;">           International Searching Authority <sup>1</sup>  <div style="text-align: center;">Swedish Patent Office</div> </td> <td style="padding: 5px;">           Signature of Authorized Officer <sup>10</sup>  <div style="text-align: center;">               Carl af Ekenstam           </div> </td> </tr> </table>			Date of the Actual Completion of the International Search <sup>1</sup> <div style="text-align: center;">1982-07-23</div>	Date of Mailing of this International Search Report <sup>2</sup> <div style="text-align: center;">1982-07-29</div>	International Searching Authority <sup>1</sup> <div style="text-align: center;">Swedish Patent Office</div>	Signature of Authorized Officer <sup>10</sup> <div style="text-align: center;">               Carl af Ekenstam           </div>														
Date of the Actual Completion of the International Search <sup>1</sup> <div style="text-align: center;">1982-07-23</div>	Date of Mailing of this International Search Report <sup>2</sup> <div style="text-align: center;">1982-07-29</div>																			
International Searching Authority <sup>1</sup> <div style="text-align: center;">Swedish Patent Office</div>	Signature of Authorized Officer <sup>10</sup> <div style="text-align: center;">               Carl af Ekenstam           </div>																			

**THIS PAGE BLANK (USPTO)**